State of California
AIR RESOURCES BOARD

STAFF REPORT

ANALYSIS OF SAN DIEGO'S 2007 STATE IMPLEMENTATION PLAN FOR OZONE

Date of Release: May 10, 2007
Scheduled for Consideration: May 24, 2007

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER THE APPROVAL OF THE 2007 SAN DIEGO 8-HOUR OZONE ATTAINMENT PLAN

The Air Resources Board (the Board or ARB) will conduct a public meeting at the time and place noted below to consider the approval of the 2007 San Diego 8-Hour Ozone Attainment Plan.

DATE: May 24, 2007

TIME: 9:00 a.m.

PLACE: San Diego Marriott Del Mar Hotel
Grand Ballroom
11966 El Camino Real
San Diego, California 92130

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., Thursday, May 24, 2007 and will continue at 8:00 a.m., Friday, May 25, 2007. This item may not be considered until May 25, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before May 24, 2007, to determine the day on which this item will be considered.

For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette or computer disk. Please contact ARB's Disability Coordinator at 916-323-4916 by voice or through the California Relay Services at 711, to place your request for disability services. If you are a person with limited English and would like to request interpreter services, please contact ARB's Bilingual Manager at 916-323-7053.

Background

The federal Clean Air Act (the Act) establishes planning requirements for those areas that routinely exceed the health-based National Ambient Air Quality Standards (NAAQS). These nonattainment areas must develop and implement a State Implementation Plan (SIP) that demonstrates how they will attain the standards by specified dates. Federal law holds each state responsible for implementing the provisions of the Act.

In July 1997, the U.S. Environmental Protection Agency (U.S. EPA) promulgated a new 8-hour NAAQS for ozone. U.S. EPA classified the San Diego Air Basin as a “basic” nonattainment area with an attainment date of June 2009. The San Diego Air Pollution Control District (District) developed an attainment plan with input from interested parties. The District’s attainment demonstration indicates that the local, State, and federal controls already in place will reduce emissions sufficiently by 2008 to allow San Diego to attain the ozone standard by the 2009 deadline.

Proposed Action

The District released its draft plan on March 1, 2007 and held a public workshop on April 2, 2007. The District governing board is scheduled to consider approval of the plan at a duly noticed public hearing on May 23, 2007. ARB staff has reviewed the Draft 8-Hour Ozone Attainment Plan for San Diego County and concluded that it meets applicable federal requirements. ARB staff also concluded that the implementation of the April version of the plan would reduce ozone levels throughout San Diego to the benefit of public health and result in attainment of the 8-hour ozone standard by June 2009. ARB staff recommends that the Board approve the San Diego plan as a revision to the California SIP and direct the Executive Officer to submit the plan to U.S. EPA. If the governing board makes changes to the draft plan at its hearing on May 23, ARB staff will consider the changes, and recommend appropriate actions at the ARB meeting.

ARB staff will present a written Staff Report at the meeting. Copies of the report may be obtained from the Board's Public Information Office, 1001 "I" Street, 1st Floor, Environmental Services Center, Sacramento, CA 95814, (916) 322-2990, on May 10, 2007. The report may also be obtained from ARB's internet site at http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm.

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by email before the meeting. To be considered by the Board, written comments submissions not physically submitted at the meeting must be received **no later than 12:00 noon, Wednesday, May 23, 2007,** and addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

Facsimile submittal: (916) 322-3928

The Board requests, but does not require 30 copies of any written submission. Also, the ARB requests that written and email statements be filed at least 10 days prior to the meeting so that ARB staff and Board members have time to fully consider each

comment. Further inquiries regarding this matter should be directed Ms. Karen Khamou, Air Pollution Specialist, (916) 322-1502, 1001 “I” Street, P.O. Box 2815, Sacramento, California 95812.

CALIFORNIA AIR RESOURCES BOARD

/s/
Catherine Witherspoon
Executive Officer

Date: May 8, 2007

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Website at www.arb.ca.gov.

[This page intentionally left blank.]

Table of Contents

[This page intentionally left blank.]

EXECUTIVE SUMMARY

The federal Clean Air Act (the Act) establishes planning requirements for those areas that routinely exceed the health-based National Ambient Air Quality Standards (NAAQS). These nonattainment areas must develop and implement a State Implementation Plan (SIP) that demonstrates how they will attain the standards by specified dates. Federal law holds each state responsible for implementing the provisions of the Act.

In July 1997, U.S. Environmental Protection Agency (U.S. EPA) promulgated a new 8-hour NAAQS for ozone. U.S. EPA classified the San Diego Air Basin as a "basic" nonattainment area with an attainment date of June 2009. The San Diego Air Pollution Control District (District) developed the 8-Hour Ozone Attainment Plan for San Diego County (Plan) with input from interested parties. The District's attainment demonstration indicates that the local, State, and federal controls already in place will reduce emissions sufficiently by 2008 to allow San Diego to attain the ozone standard by the 2009 deadline.

The District staff released a draft plan on March 1, 2007 and held a public workshop on April 2, 2007. The District governing board is scheduled to consider adoption of the draft April 2007 Plan on May 23, 2007. ARB staff has reviewed the Plan and concluded that it meets applicable federal State Implementation Plan (SIP) requirements. ARB staff also concludes that the implementation of the Plan would reduce ozone levels throughout San Diego to the benefit of public health and result in attainment of the 8-hour ozone standard by June 2009. ARB staff recommends that the Board approve the April 2007 version of the Plan as a revision to the California SIP and direct the Executive Officer to submit the plan to U.S. EPA. If the Plan changes at the San Diego Board hearing on May 23, ARB staff will consider and recommend appropriate actions.

[This page intentionally left blank.]

I. BACKGROUND

Profile of San Diego

The San Diego federal non-attainment area lies in the southwest corner of California and comprises all of San Diego County. San Diego is 120 miles south of Los Angeles and shares an 80-mile border with Mexico; the City of San Diego is adjacent to the Baja, California city of Tijuana. Its diverse terrain stretches from the Pacific to the Laguna Mountains and includes miles of ocean and bay shoreline, forested hills, fertile valleys, mountains, canyons, and desert. Consequently, San Diego's climate varies from a mild climate on the coast to highly variable temperatures in the desert. September and October often produce the hottest days of the year.

San Diego County covers 4,200 square miles and is home to about eight percent of the State's population. The region's population and emissions are concentrated in the western portion of the county. The city of San Diego, with a population of over 2.9 million, is the second largest city in California. The border region cities of San Diego and Tijuana, Mexico, have a combined population of over 4.8 million.

Air quality in the San Diego air basin is affected by both local emissions and ozone and ozone precursor emissions transported from the South Coast Air Basin. The Air Resources Board's (ARB or Board) ozone transport assessments have also identified Mexico as a contributor to high ozone levels in San Diego.

Health Effects of Ozone

Ozone is a highly reactive gas that forms in the atmosphere through complex reactions between chemicals directly emitted from motor vehicles, industrial plants, consumer products and many other sources. Ozone is a secondary gas, formed in the atmosphere by the interaction of reactive organic compounds (ROG) and oxides of nitrogen (NOx) in the presence of sunlight.

Considerable research conducted over the past 35 years has shown that ozone can lead to inflammation and irritation of the tissues lining human airways. This causes the muscle cells in the airways to spasm and contract, thus reducing the amount of air that can be inhaled. Symptoms and responses to ozone exposure vary widely, even when the amount inhaled and length of exposure is the same. Typical symptoms include cough, chest tightness, and increased asthma symptoms. Ozone in sufficient doses can also increase the permeability ("leakiness") of lung cells, making them more susceptible to damage from environmental toxins and infection.

Medical studies of large populations have found that ozone exposure is associated with an increase in hospital admissions and emergency room visits, particularly for lung problems such as asthma and chronic obstructive pulmonary disease. Several studies have also associated exposure to high ozone levels with increased premature mortality in elderly people with chronic diseases of the lungs and circulatory system.

People who exercise or work outdoors are at greater risk of experiencing adverse health effects from ozone exposure because they inhale more ozone. One study in southern California found that children who participated in more sports activities in high ozone areas were more likely to develop asthma than those who participated in fewer sports. Children and adolescents are at increased risk because they are more likely to spend time outdoors engaged in vigorous activities, and because they inhale more ozone per pound of body weight as compared to adults.

Historical Air Quality

Air quality in San Diego has improved significantly over the last decade as measured by the decline in measured ozone concentrations, and in the number of days over the 8-hour standard of 0.08 parts per million (ppm).

Ozone "design values" are used to characterize a region's air quality for SIP planning purposes. The design value is a three-year average of the annual fourth highest daily maximum 8-hour average ozone concentrations. The use of the 3-year average helps minimize the year to year influence of meteorology. The U.S. Environmental Protection Agency (U.S. EPA) designated San Diego as "nonattainment" based on its 2001-2003 design value. As Figure I shows, San Diego's design value has declined by 15 percent in the past ten years.

The number of days over the standard (exceedance days) is an indication of how frequently the population is exposed to unhealthful air quality. Figure II illustrates the decline in number of days over the standard in San Diego. In the past ten years, the number of days annually in which ozone concentrations in San Diego exceed the national 8-hour standard has declined by 54 percent. The San Diego region has also experienced a shortened ozone season in recent years. Since 2001, the San Diego region has not exceeded the standard before May or after October.

The air quality monitor in Alpine-Victoria has recorded the County's highest ozone levels for all but three of the last 10 years. The monitoring site is located in the foothills east of the City of San Diego and is 2,000 feet above sea level. The site is impacted by emissions from both San Diego and the South Coast Air Basin. San Diego's 2006 design value is 0.088 ppm, which is an increase from the 2005 design value of 0.086 ppm. San Diego, like the rest of California, experienced record high summer temperatures in 2006 that were conducive to ozone formation.

Figure I. San Diego Air Basin
Federal 8-hr Ozone Design Value (1990-2006)

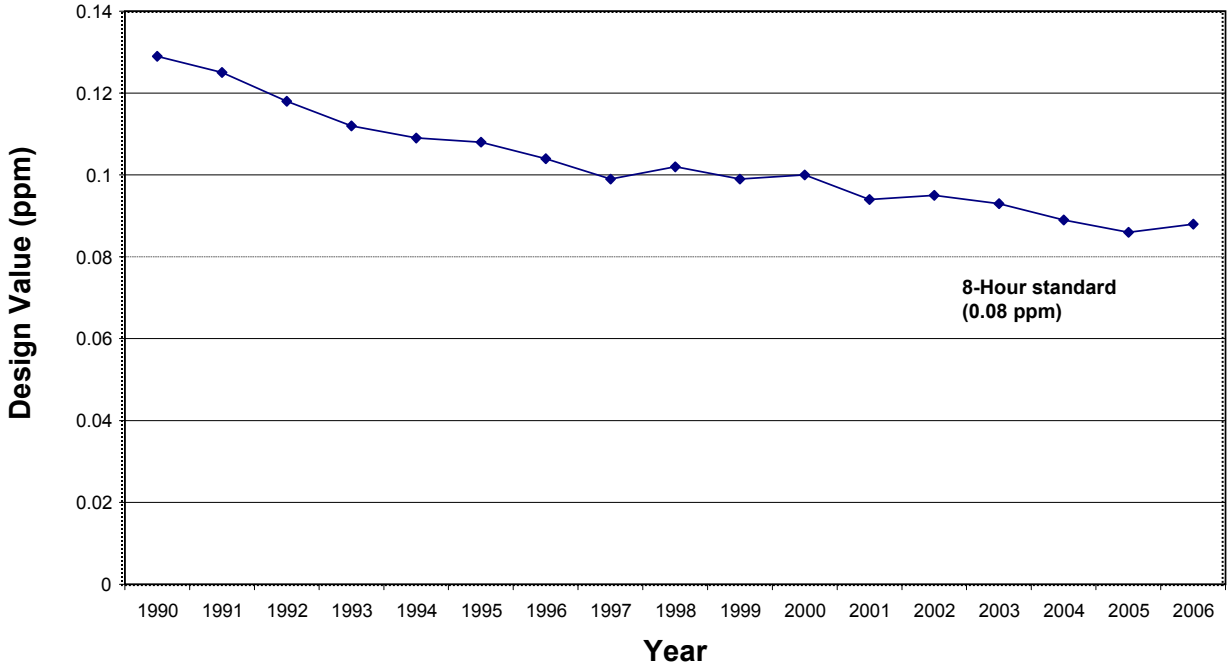
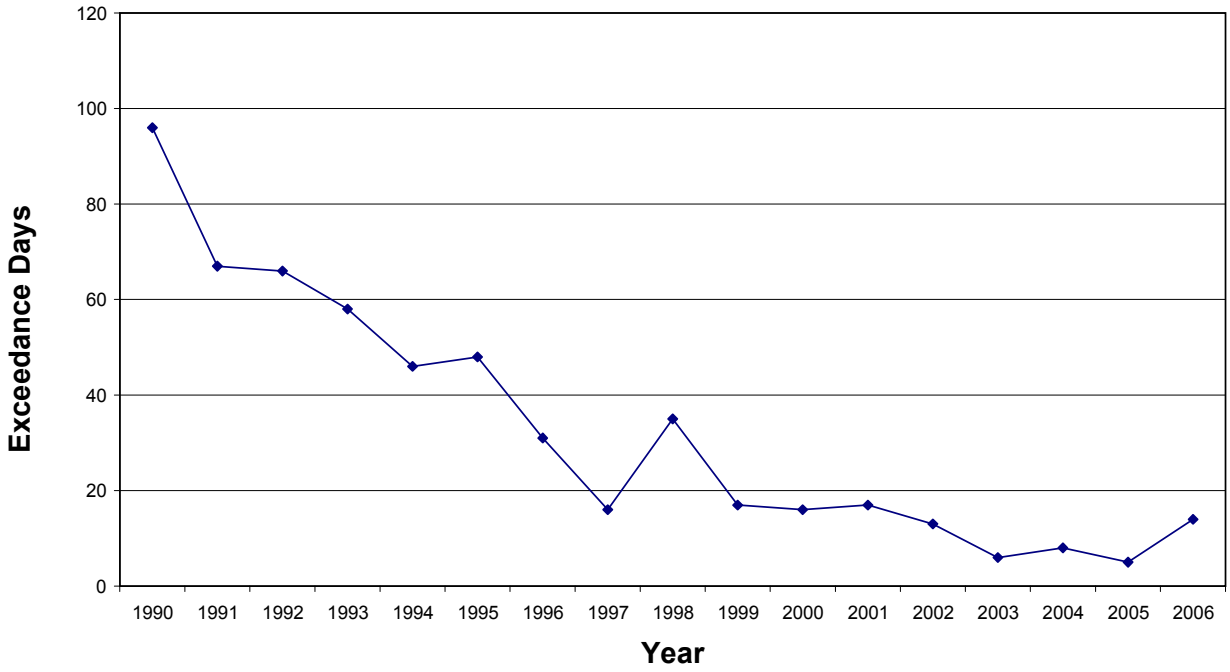


Figure II. San Diego Air Basin
Federal 8-hr Ozone Exceedance Days (1990-2006)



II. AIR QUALITY PLANNING

Air Quality Planning Background

The federal Clean Air Act (the Act) establishes planning requirements for those areas that routinely exceed the health-based National Ambient Air Quality Standards (NAAQS). These nonattainment areas must develop and enact State Implementation Plans (SIPs) that demonstrate how they will attain the standards by specified dates. Federal law holds each state responsible for implementing the provisions of the Act.

State law[1] designates the ARB as the State's air pollution control agency for all purposes set forth in federal law, including the preparation of the SIP. State law further specifies that the ARB must adopt the nonattainment area plan approved by a local air district, unless the ARB finds, after a public hearing, that the locally adopted plan will not meet the requirements of the Act.[2] California SIP revisions must be submitted to U.S. EPA by ARB. The provisions and commitments in a U.S. EPA-approved SIP are federally enforceable. The Act also allows interested parties to sue U.S. EPA, the state, or local agencies to compel implementation of an approved SIP and other provisions of the Act.

Recent Air Quality Planning Activities

The 2007 ozone SIP is the latest step in the air quality planning process that over the years has helped define new actions to improve San Diego's air quality. The District developed the local plan with input from interested parties. The District first published a draft of their 8-hour ozone plan for public review on March 1, 2007. The District held a public workshop on April 2, 2007 to discuss its analysis and 8-Hour Ozone Attainment Plan. The District's Air Pollution Advisory Committee, made up of stakeholders appointed by the District Board, reviewed the plan and recommended that the Board approve it. District staff will present the final draft of the plan to the San Diego APCD Board for consideration at a duly noticed local hearing that is tentatively scheduled for May 23, 2007.

8-hour Ozone Planning Requirements

Ozone Standard

Less than 0.08 parts per million for 8 hours, not to be exceeded, based on the fourth highest concentration averaged over three years.

In July 1997, U.S. EPA promulgated a new NAAQS for ozone that provides additional protection from the harmful health effects of this pollutant. The new ozone standard protects against longer pollutant exposure periods by requiring that ozone concentrations not exceed specified levels over an 8-hour period instead of a 1-hour period. In April 2004, U.S. EPA finalized "Phase 1" of the ozone implementation rule. This rule established the classification scheme for nonattainment areas and identified continuing obligations

[1] California Health and Safety Code (HSC) section 39602.
[2] HSC Section 41650(a).

with respect to the existing 1-hour ozone requirements. The San Diego Air Basin is classified as a basic nonattainment area with an attainment date of June 2009. A basic category refers to an 8-hour ozone nonattainment area whose 1-hour ozone design values meet the now revoked 1-hour ozone NAAQS. San Diego attained the former federal 1-hour standard in 2001. On November 9, 2005, U.S. EPA supplemented its "Phase 1" implementation rule with a "Phase 2" rule. The "Phase 2" rule outlines the emission controls and planning elements that nonattainment areas must address in their implementation plans.

U.S. EPA's "Phase 1" 8-hour ozone implementation rule requires all basic nonattainment areas to meet the general planning and emission control requirements of Subpart 1 (of Part D of Title I) of the Act. Basic nonattainment areas are not subject to the additional, more prescriptive requirements of Subpart 2, which were established for the former 1-hour ozone NAAQS.

SIPs for Subpart 1 areas must include:

- air quality modeling that demonstrates attainment of the 8-hour ozone standard;
- an emissions inventory;
- transportation conformity emission budgets to ensure transportation plans and projects are consistent with, and will not hinder attainment;
- adopted control strategies capable of meeting attainment, and contingency measures in the event the controls fall short of achieving needed reductions; and
- New Source Review rules.

In order to demonstrate attainment of the 8-hour ozone standard by San Diego's June 2009 deadline, the SIP must show that all of the emissions reductions needed for attainment are in place by the beginning of the ozone season in 2008. This is because ozone nonattainment areas are required to model attainment in the full ozone season prior to the area's attainment date[1].

Appeals Court Decision and Implications for Subpart I Areas

In December 2006, a federal Appeals Court vacated U.S. EPA's "Phase 1" 8-hour ozone implementation rule. The Court stated that basic nonattainment areas with 8-hour ozone levels exceeding 0.09 ppm (a level the Court considered to provide equivalent health protection equivalent to the former 1-hour ozone NAAQS of 0.12 ppm) must also be subject to the more prescriptive Subpart 2 requirements. However, U.S. EPA has asked the Court to reconsider its decision. It is not clear if and when U.S. EPA will reclassify Subpart 1 areas.

The District plan indicates that if San Diego is reclassified as a Subpart 2 nonattainment area, the District will revise its SIP to fully address the necessary requirements.

[1] 40 CFR 51.908(d).

III. PLAN EVALUATION

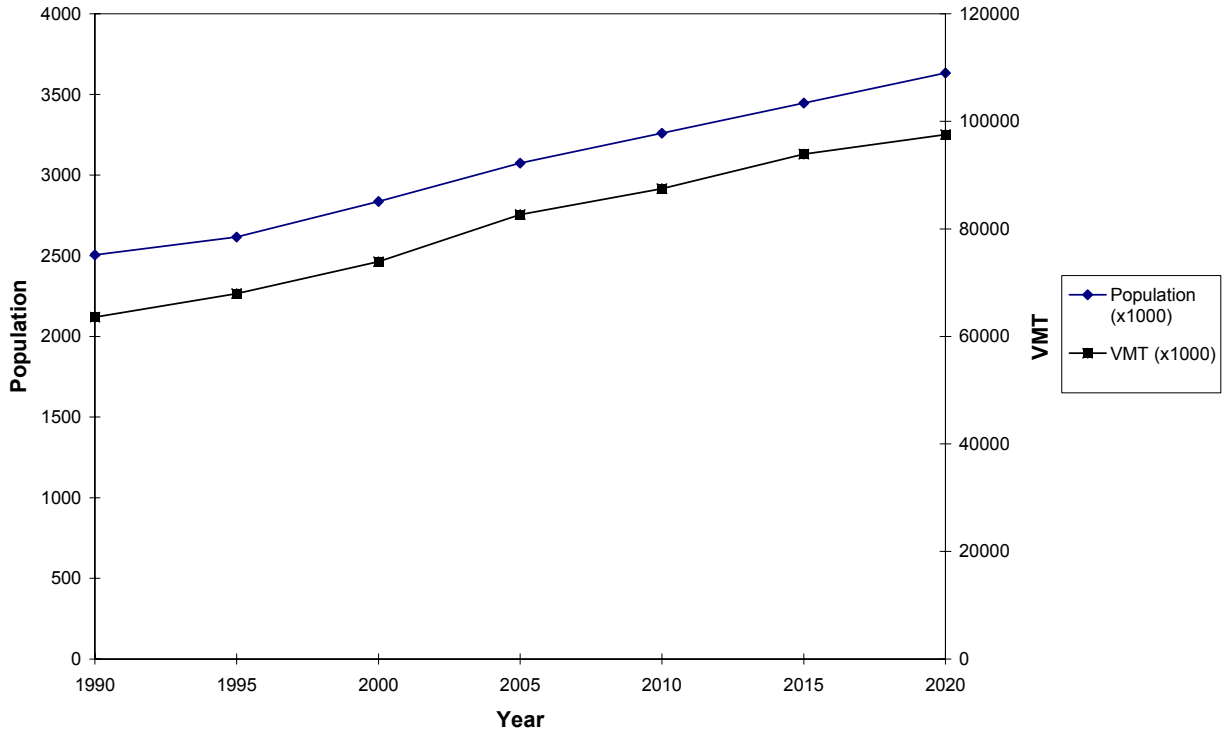
Emissions Inventory

Most of San Diego's population resides in the western, coastal portion of the county. The eastern side of the county is much more rural; it encompasses the 720-square mile Cleveland National Forest and numerous farms. The primary mode of transportation is passenger vehicles, although the downtown area is serviced by light rail and buses.

San Diego's economy has experienced dramatic change since the end of the cold war. Although the United States Navy, Marines, and Coast Guard continue to have a strong presence, San Diego's economy has transformed into a mix of high-technology industries such as telecommunications and biotechnology, international trade operations, and electronics and defense-related manufacturing. San Diego's climate and ocean-front also make it a prime location for recreation and tourism, which ranks as the third largest economic sector, behind manufacturing and military.

San Diego County is experiencing significant growth in population and vehicle use. Population in the region is expected to increase by 16 percent, from 3.1 million today to over 3.6 million in 2020. Vehicle use as measured in vehicle miles traveled (VMT) is projected to increase by 17 percent during this same period, from over 83 million miles per day today to over 97 million miles per day in 2020. San Diego's overall air quality improvement, despite high growth rates, illustrates the benefits of cleaner technologies. Figure III charts San Diego's population and VMT growth from 1990 to 2020.

Figure III. San Diego Air Basin Population and VMT Growth



Baseline Emissions

The main sources of San Diego's NOx emissions are on-road vehicles, ships and commercial boats, and off-road equipment. San Diego's ROG inventory is dominated by passenger cars, consumer products, architectural coatings, recreational boats, and lawn and garden equipment. The inventories reflect the region's urban and suburban population and the strong goods movement sector. The following two tables show the top 25 NOx and ROG emission sources in San Diego's 2006 emissions inventory. The tables indicate that emissions of both precursors will continue to decline into and well beyond the region's 2009 attainment year.

Table I. NOx Emissions
San Diego Air Pollution Control District
2007 SIP Summer Season Emissions Inventory (Tons per Day)

(Prioritized by 2006 emissions)

Source Category	2006	2009	2012
PASSENGER VEHICLES*	44	41	33
HEAVY DUTY DIESEL TRUCKS	51	39	33
SHIPS AND COMMERCIAL BOATS**	31	32	35
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	26	22	18
OFF-ROAD EQUIPMENT***	13	12	10
GASOLINE-FUELED COMMERCIAL TRUCKS	7	6	5
RECREATIONAL BOATS	6	7	7
AIRCRAFT	5	6	6
FARM EQUIPMENT (COMBINES AND TRACTORS)	4	4	3
COGENERATION (ELECTRICITY GENERATION AND HEAT RECOVERY)	3	3	3
ELECTRIC UTILITIES	2	4	4
PUBIC TRANSIT BUSES	2	2	2
RESIDENTIAL FUEL COMBUSTION	2	2	2
OFF-ROAD EQUIPMENT (LAWN AND GARDEN)	2	1	1
LOCOMOTIVES	1	1	2
OTHER (FUEL COMBUSTION)	1	1	1
MOTOR HOMES	1	1	1
SCHOOL BUSES	1	1	1
MOTORCYCLES	1	1	1
MANUFACTURING AND INDUSTRIAL (BOILERS, IC ENGINES)	1	1	1
SERVICE AND COMMERCIAL (BOILERS, IC ENGINES)	1	1	1
COMMERCIAL TRANSIT BUSES	1	1	1
LANDFILLS (LANDFILL GAS EMISSIONS)	<1	<1	<1
MINERAL PROCESSES (MINING, CEMENT MANUFACTURING)	<1	<1	<1
AGRICULTURAL IRRIGATION PUMPS	<1	<1	<1
All Other Sources	<1	<1	<1
TOTAL	**208**	**189**	**170**

* Includes cars, light and medium duty trucks, minivans, and SUVs.

**Includes emissions out to 100 nautical miles.

***Includes transport refrigeration units, airport ground support equipment, and cargo handling equipment.

Table II. ROG Emissions
San Diego Air Pollution Control District
2007 SIP Summer Season Emissions Inventory (Tons per Day)

(Prioritized by 2006 emissions)

Source Category	2006	2009	2012
PASSENGER VEHICLES*	45	37	30
CONSUMER PRODUCTS	20	19	20
RECREATIONAL BOATS and WATER CRAFT	19	17	16
OFF-ROAD EQUIPMENT (LAWN AND GARDEN)	11	11	10
ARCHITECTURAL COATINGS (PAINTS AND THINNERS)	10	11	11
PETROLEUM MARKETING (GASOLINE EVAPORATIVE LOSSES)	8	9	9
COATINGS (PAINTS AND THINNERS - NON ARCHITECTURAL)	7	7	8
GASOLINE-FUELED COMMERCIAL TRUCKS	5	4	3
OFF-ROAD EQUIPMENT**	5	4	3
MOTORCYCLES	5	4	4
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	4	4	3
GAS CANS	4	3	2
PRINTING	4	4	4
AIRCRAFT	3	3	3
HEAVY DUTY DIESEL TRUCKS	3	2	2
OFF-ROAD RECREATIONAL VEHICLES	3	3	3
ADHESIVES AND SEALANTS	3	3	2
COOKING	2	2	2
SHIPS AND COMMERCIAL BOATS***	2	2	2
COGENERATION (ELECTRICITY GENERATION AND HEAT RECOVERY)	2	2	2
ASPHALT PAVING / ROOFING	2	2	2
LANDFILLS (LANDFILL GAS EMISSIONS)	2	2	2
DEGREASING	2	2	2
CHEMICAL (PROCESS AND STORAGE LOSSES)	2	2	2
PESTICIDES	1	1	1
All Other Sources	6	6	6
TOTAL	**178**	**164**	**155**

* Includes cars, light and medium duty trucks, minivans, and SUVs.

**Includes transport refrigeration units, airport ground support equipment, and cargo handling equipment.

***Includes emissions out to 100 nautical miles.

Because the ozone attainment deadline falls in the middle of the 2009 ozone season and design values are calculated for calendar years, the SIP must provide for sufficient emission reductions in 2008 in order to demonstrate attainment in 2009. The following table summarizes emission reductions from 2006, the base year for this plan, to 2008, the ozone season that must be modeled to demonstrate attainment by June 2009. ARB staff finds that the emission inventory accurately represents NOx and ROG emissions and reductions over time within San Diego County.

Table III. Baseline Emission Trends with Measures Adopted as of 2006
(San Diego, Summer Planning, in tons per day)

	ROG			NOx		
Source Category	**2006**	**2008**	**% Change**	**2006**	**2008**	**% Change**
Stationary & Area-wide	67.3	68.0	+1.1%	10.7	12.2	+13.3%
On-Road Motor Vehicles	58.5	51.1	-12.6%	108.1	96.8	-10.5%
Off-Road Vehicles and Equipment	52.3	48.5	-7.2%	88.7	85.8	-3.3%
TOTAL	178.1	167.6	-5.9%	207.5	194.8	-6.2%

Emission Reduction Credits

Federal New Source Review (NSR) rules require new and modified major stationary sources that increase emissions in amounts exceeding specified thresholds to provide emission reduction offsets to mitigate the emissions growth. Emission reduction offsets represent either on-site emission reductions or the use of banked emission reduction credits (ERCs). ERCs are voluntary, surplus emission reductions that are registered with the District for future use as offsets.

Table IV. San Diego APCD
Emission Reduction Credit Banking Summary
ERCs Issued 2002 and Earlier
(San Diego, Summer Planning, in tons per year)

Pollutant	ERC Total
NOx	79.2
ROG	230.3

The District added the banked ERC's shown in Table IV into the 2008 emission inventory used in the modeling demonstration of attainment. This ensures that these ERCs, which could be used to enable growth at major sources at any time, are fully accounted for in the inventories used to demonstrate attainment of the 8-hour ozone standard.

Attainment Emission Target

San Diego's attainment demonstration for the national 8-hour ozone standard is summarized in Table V. The District's attainment demonstration is based on photochemical modeling results, augmented with an analysis of the model outputs and local air quality and emissions trends. The attainment demonstration indicates that the local, State, and federal controls already in place will reduce emissions sufficiently by 2008 to allow San Diego to attain the ozone standard by the 2009 deadline. As a result, the 2008 baseline emissions – 194.8 tpd NOx and 167.6 tpd ROG – are also the region's carrying capacity[1] as shown in Table V. The modeling and supplemental analyses are detailed in an appendix of this report.

Table V. Emission Reduction Target for Ozone Attainment

San Diego (2009 attainment deadline) tons per day		
	NOx	**ROG**
2006 Emissions Inventory	207.5	178.1
Projected 2008 Emissions	194.8	167.6
Emission Reduction Target	12.7	10.5
Emission Reductions from Existing Program	12.7	10.5

Control Strategy

Because San Diego was formerly classified as a serious nonattainment area for the national 1-hour ozone standard, it has already enacted a comprehensive control program to address ozone precursors. The combined local, State, and federal emission controls resulted in the District attaining the 1-hour standard in 2001, and also substantially reduced 8-hour average ozone concentrations. Currently adopted controls under district, State, and federal jurisdiction will provide continued reductions in ozone precursors for the 2009 attainment deadline. San Diego's attainment strategy relies on these existing controls and their continued implementation.

Local Strategy

Local air districts are responsible for controlling emissions from most stationary and areawide sources. Such sources include factories, power plants, gas stations, dry cleaners, and residential water heaters. The San Diego District has already adopted rules to control NOx and ROG emissions from almost all stationary and area source categories in San Diego County. Most of these rules were fully implemented by 2002 and are reflected in the base year inventory used to develop this plan. As part of this

[1] Carrying capacity is the pollutant emissions limit that ensures air quality standards are met.

SIP cycle, the District will not adopt additional measures that will be implemented in time for the 2009 deadline, because the existing control strategy is expected to provide for attainment by 2009. However, the District is required to continue to evaluate and update rules to reduce emissions under the California Clean Air Act in order to attain the State ozone standard.

The San Diego District plan also proposes the adoption of a new control measure that will take effect in spring 2008. The measure, which will reduce the ROG content of solvents used in cold solvent cleaning operations by 1 tpd, will replace current District Rule 67.6 (Solvent Cleaning Operations) with two new rules, Rule 67.6.1 (Cold Solvent Cleaning and Stripping Operations) and Rule 67.6.2 (Vapor Degreasing Operations). The rule is being adopted simultaneously with this plan. The emission reductions from this measure are not reflected in the attainment modeling, since the rule will not be fully implemented by January 2008 (the beginning of the first full ozone season prior to the June 15, 2009, attainment deadline). However, this measure will further reduce emissions and help ensure continued attainment, and it will be submitted to ARB as a proposed SIP revision.

State Strategy

ARB is responsible for controlling emissions from mobile sources, consumer products, and fuels. ARB's on-going mobile source control program will provide significant NOx and ROG emission reductions in San Diego. Vehicles and equipment operating in California are subject to the most stringent tailpipe emission standards in the world. Between 2006 and 2008, on-road vehicle emission control programs in San Diego will decrease ROG emissions by 12.6 percent and NOx emissions by 10.5 percent.

ARB has a long history of adopting successful programs to reduce emissions from mobile sources. Regulations already adopted by ARB will continue to reduce emissions as vehicles and equipment meeting the cleanest new emission standards enter into service, as shown previously in Table III. The region will continue to benefit from these regulations as it moves closer to attaining the State ozone standard, and new equipment that conforms to these standards replace older, less controlled engines.

ARB staff is also developing new measures to help the State's nonattainment areas meet U.S. EPA's 8-hour ozone and fine particulate matter (PM2.5) standards. The proposed State Strategy is tentatively scheduled for Board consideration in June 2007. Given San Diego's early attainment date, the proposed State Strategy will not provide new reductions in 2008, and San Diego's plan does not include any reductions from proposed State measures in its attainment demonstration.

Federal Strategy

Under the CAA, U.S. EPA has exclusive authority to establish engine emission standards for a variety of mobile sources including interstate trucks, some farm and construction equipment, locomotives, aircraft, and marine vessels based in the U.S.

San Diego's plan reflects the standards that had been approved by December 1, 2006, but does not reflect any emission reductions from proposed federal actions.

Reasonably Available Control Measures

Stationary Sources

For each nonattainment area required to submit an attainment demonstration, the State must include in its plan a demonstration that it has adopted all Reasonably Available Control Measures (RACM) necessary to demonstrate attainment as expeditiously as practicable. This is different from a Reasonability Available Control Technology (RACT) assessment that pertains to applicable categories of stationary sources of VOC and NOx and is done in a separate SIP. Basic nonattainment areas are not required to make a RACT determination.

San Diego's early projected attainment date, which is based on projected 2008 emission levels with existing controls, eliminates the option of adopting additional measures for earlier attainment. Such measures would have to advance attainment to 2007, the current year.

Nonattainment areas must also meet any reasonable further progress (RFP) requirements. The 2009 attainment date also eliminates the need for a reasonable further progress demonstration in the 2008 milestone year.

Transportation Sources (Transportation Control Measures)

U.S. EPA has identified 16 transportation control measures (TCMs) that must be evaluated as part of a RACM demonstration. TCMs include options for reducing vehicle use, or for reducing conditions that lead to higher vehicle emissions. The draft plan indicates that the District has identified and implemented 13 TCMs as RACM for transportation in San Diego. Since these RACM are already being implemented they do not provide new reductions that would advance the attainment year.

ARB staff concurs with the District's assessment of RACM for stationary and transportation sources.

Contingency Strategy

U.S. EPA requires each plan to identify contingency emission reductions that will take effect should an area fail to attain by the attainment date specified in its SIP. U.S. EPA also requires that the SIP demonstrate that additional contingency emission reductions are available for each milestone year, should they be needed. These reductions must come from measures that will take effect without further action. U.S. EPA has interpreted this to mean that the contingency reductions must come from measures that have already been adopted when the SIP is submitted (or possibly prior to U.S. EPA taking action).

San Diego's plan relies on the existing State mobile source control measures to satisfy contingency requirements. The table below shows mobile source emission reductions over time. The District relies on these measures because they will continue to be implemented, and to reduce motor vehicle emissions, regardless of the air basin's attainment status in 2009.

Table VI. San Diego Air District's Mobile Source Emissions

Source Category	ROG			NOx		
	2009	**2010**	**2011**	**2009**	**2010**	**2011**
On-Road Mobile	47.9	44.9	42.5	92.0	87.0	81.5
Off-Road Mobile*	47.0	45.6	44.4	84.3	82.7	82.1
Total	94.9	90.5	86.9	176.3	169.7	163.6

*Off-road emissions extend over the ocean, out to 100 nautical miles.

Attainment Demonstration

San Diego's "basic" nonattainment area classification gives it a June 15, 2009 attainment date. San Diego needs to demonstrate a design value of 0.084 ppm (at most) in 2008 to attain the 8-hour ozone standard. In 2005, the District exceeded the standard on 5 days with an ozone design value of 0.086 ppm, which is approximately two percent over the standard. In 2006, San Diego like much of the rest of California experienced record high summer temperatures. As a result, the district exceeded the standard on 14 days and the design value increased to 0.088 ppm. Existing control programs are expected to reduce the ozone precursors ROG and NOx by about six and seven percent, respectively, by the 2009 deadline. The District's analysis indicates that these programs will be sufficient to attain the 8-hour standard by 2009, despite the impact of the unusually severe 2006 ozone season had on the District's design value. A more detailed description of the modeling analysis is provided in the "Attainment Demonstration" appendix to this report.

Photochemical Modeling

The photochemical modeling used in the San Diego plan was conducted by an air quality expert under contract to the District. The modeler used the EPA-accepted "Comprehensive Air Quality Model with Extensions" (CAMx) modeling system to estimate the emissions reductions needed to achieve the ozone standards. A meteorological model, Mesoscale Model version 5 (MM5), was used to drive the transport and dispersion in the CAMx model. The South Coast Air Quality Management District and ARB are using this same combination for modeling ozone in other parts of Southern California, but the San Diego-specific modeling employed enhanced local meteorological inputs.

San Diego's air quality modeling predicts a 2008 design value of 0.086 ppm, which exceeds the 0.084 ppm attainment standard. U.S. EPA's ozone modeling guidance indicates that when photochemical modeling projects attainment year concentrations of 0.082-0.087 ppm, the State may conduct further analyses of the model outcomes and

consider other evidence such as emissions and air quality trends data. If the weight of this evidence supports a finding that the proposed control program will result in attainment by the statutory deadline, the State may consider this evidence in determining whether the proposed control program will result in attainment. San Diego's plan utilizes such a weight of evidence (WOE) attainment demonstration. The District's modeling approach is summarized in the appendix to this report.

Weight of Evidence Analysis

San Diego's attainment demonstration incorporates a supplementary WOE analysis as allowed under U.S. EPA's April 2007 Final Guidance on the Use of Models and Other Analyses for Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze. The District concludes that the evidence indicates that the adopted emission controls will reduce ozone concentrations to the level needed to meet the 8-hour ozone standard by the statutory attainment deadline of June 15, 2009. ARB staff analysis of this plan concurs with the District's conclusion of attainment in 2009.

San Diego's WOE analysis includes additional modeling results, statistical air quality trends analyses, graphical air quality trends analyses, and meteorological analyses. The WOE includes five statistical analyses of 8-hour ozone design values, which together suggest that ozone levels can be expected to be reduced to below 0.085 ppm by 2008. Numerous graphical analyses illustrating the continuing downward trends in ozone and precursor concentrations are also presented, and are summarized in the appendix to this report.

ARB Analysis

ARB staff independently modeled an additional San Diego episode that occurred in July, 2005. ARB's analysis did not include the enhanced local meteorological data used in the District's modeling. This preliminary modeling, using projected 2010 emissions, projected a basin high 8-hour average of 0.085 ppm at the Alpine monitor, without a WOE analysis. Thus, ARB's modeling generally confirms the direction and magnitude of the District's findings.

ARB staff analysis of the District's attainment demonstration concurs with the conclusion of attainment in 2009.

Reasonable Further Progress

The first year the District would be required to show Reasonable Further Progress towards attainment is 2008, the year the District must model attainment for the June 15, 2009 deadline. As a result, the District is not required to include a Reasonable Further Progress demonstration in its Plan.

Transportation Conformity Budgets

San Diego's plan establishes county level on-road motor vehicle emissions transportation conformity budgets for 2008. The emissions budgets reflect the latest planning assumptions and were developed using ARB's latest on-road mobile source emission factor model EMFAC2007.

The new emissions budgets, based on summer planning daily emissions for ROG and NOx, are shown in Table VIII. The budgets were developed from activity data provided by the San Diego Association of Governments (SANDAG), which ARB then incorporated into the EMFAC2007 motor vehicle emission model. The heavy-heavy duty diesel truck vehicle miles traveled (VMT) from 2005 to 2009 were adjusted to match EMFAC2007 VMT estimates with SANDAG estimates. EMFAC outputs were also adjusted to account for baseline emission reductions not reflected in EMFAC2007. These budgets will become applicable when U.S. EPA finds the budgets adequate.

The emission budgets established in this plan fulfill the requirements of the Act and U.S. EPA regulations to ensure that transportation projects will not interfere with progress towards, and attainment of, the national 8-hour ozone standard.

Table VII. On-Road Motor Vehicle Emission Budgets for Ozone
(San Diego, Summer Planning, in tons per day)

Pollutant	2008 and Subsequent Years
ROG	53
NOx	98

IV. ENVIRONMENTAL IMPACTS

The California Environmental Quality Act (CEQA) requires that State and local agency projects be assessed for potential significant environmental impacts. Air quality plans are "projects" that are potentially subject to CEQA requirements. In its Notice of Preparation/Initial Study for this plan, the San Diego APCD found that the plan would not have a significant effect on the environment and prepared a Negative Declaration. ARB staff have reviewed the San Diego 8-Hour Ozone Plan and the Negative Declaration and concur that plan will not have a significant effect on the environment.

V. LEGAL AUTHORITY

The Act requires states to provide for the attainment of national ambient air quality standards. The primary tool to be used in the effort to attain national ambient air quality standards is a plan that any state with one or more nonattainment areas must develop, which provides for implementation, maintenance and enforcement of the standards—the State Implementation Plan (section 110(a)(1)). Section 110(a)(2)(A) of the Act broadly authorizes and directs states to include in their SIPs:

> "...enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of the Act."

State law charges the ARB with coordinating State, regional, and local efforts to attain and maintain both State and national ambient air quality standards. The direct statutory link between ARB and the mandates of the Clean Air Act is found in section 39602 of the Health and Safety Code (HSC). This provision states:

> "The state board is designated the air pollution control agency for all purposes set forth in federal law.
>
> The state board is designated as the state agency responsible for the preparation of the state implementation plan required by the Clean Air Act (42 U.S.C., Sec. 7401, et seq.) and, to this end, shall coordinate the activities of all districts necessary to comply with that act."

State law also limits what the ARB may submit as a SIP revision. HSC section 39602 goes on to state,

> "Notwithstanding any other provision of this division, the state implementation plan shall only include those provisions necessary to meet the requirements of the Clean Air Act."

ARB will exclude any provisions of the San Diego plan that relate solely to the California Clean Air Act requirements from the SIP submittal.

VI. STAFF RECOMMENDATIONS

As described in this report, ARB staff has reviewed the 2007 San Diego Draft 8-Hour Ozone Attainment Plan, and consulted extensively with District staff during this review.

ARB staff finds that the 2007 San Diego Draft 8-Hour Ozone Attainment Plan meets applicable requirements. Staff further concludes that implementation of this plan would reduce ozone levels throughout San Diego, benefit public health, and result in attainment of the 8-hour ozone standard by June, 2009. Therefore, we recommend that the Board take the following actions:

(1) Adopt the 2007 San Diego 8-Hour Ozone Attainment Plan as a revision to the California SIP, including the control strategy, emission inventories, attainment demonstration, and motor vehicle emission budgets.

(2) Direct the Executive Officer to submit the plan to U.S. EPA as a revision to the California SIP.

[This page intentionally left blank.]

APPENDIX

SAN DIEGO'S 2007 STATE IMPLEMENTATION PLAN FOR THE 8-HOUR FEDERAL OZONE STANDARD

ATTAINMENT DEMONSTRATION

[This page intentionally left blank.]

Overview

The federal Clean Air Act requires the use of air quality modeling to relate ozone levels to emissions in a region, and to simulate the impact of planned emission reductions on future air quality. Air quality modeling uses day-specific emission inventories, meteorological and air quality measurements, and chemical mechanisms to establish this relationship. U.S. EPA requires the use of air quality modeling in attainment demonstration plans for ozone nonattainment areas classified as "basic" or above.

A regional air quality model cannot capture exactly the nuances of emissions, meteorology, and photochemical reactions that occur in the air. As a result, regional air quality models are best used to describe, in relative terms, how we expect air quality levels to change as emission levels change. An air quality plan, on the other hand, is required to specify the emissions burden that an area can withstand while still attaining the ambient air quality standards. U.S. EPA's modeling guidance recommends the use of supplemental analyses to bridge the gap between modeling uncertainties and planning needs. Where a model predicts attainment year design values that are within a range of allowed uncertainty, U.S. EPA recommends supplemental analyses to demonstrate attainment despite the modeled projections, if the weight of the evidence supports a finding that the proposed strategy will result in attainment.

The San Diego Air Pollution Control District hired Atmospheric Information Systems to conduct the refined regional modeling used in support of San Diego APCD's 2007 Ozone Plan. The modeling and related analyses support a finding that existing controls will bring the San Diego Ozone Nonattainment Area into attainment for national 8-hour ozone standard by the June, 2009 deadline. ARB staff provided gridded emission inventories for this effort, and also conducted preliminary modeling for San Diego using 2010 emission projections. ARB's preliminary modeling supports the District's attainment demonstration.

For a detailed description of the District's modeling and analysis used in the San Diego attainment demonstration, please refer to Attachment H of the San Diego Air Pollution Control District's April, 2007 Eight-Hour Ozone Attainment Plan for San Diego County.

Ozone Episode

An ozone modeling analysis begins with the selection of the episode(s) to be modeled. The episodes are periods of one or more consecutive days of high ozone levels, for which detailed emissions, meteorological conditions, and air quality data have been assembled and studied. U.S. EPA recommends use of 10 or more days for modeling 8-hour ozone design values to develop relative reduction factors (RRFs), but has indicated that it will accept modeling based on five episode days. U.S. EPA further recommends that the calculation of RRFs be based on days for which reference year (2002) predicted concentrations are 85 ppb[1] or higher, although days with at least

[1] U.S. EPA modeling guidance uses parts per billion (ppb) even though the NAAQS is expressed in terms of parts per million (ppm). One thousand (1000) ppb equals 1 ppm. Thus, 86 ppb equals 0.086 ppm.

70 ppb are acceptable. Air quality modeling results are also evaluated based on performance criteria which compare simulated and observed ozone concentrations[1].

The District modeled two episodes chosen from the 1997 Southern California Ozone Study (SCOS97). Comprehensive air quality and meteorological data are available for this study, which covered the entire Southern California region. Although San Diego experienced relatively low ozone during 1997, two episodes included high ozone days in San Diego that met U.S. EPA's modeling criteria. The two modeling episodes chosen for use in this plan were August 4-7, 1997, and September 27-28, 1997. During the August episode, high ozone levels in San Diego were caused by local emissions and air pollution transported from the South Coast Air Basin. The September episode's high ozone levels occurred over a weekend as a result of local emissions[2].

San Diego used a total of six days from the two ozone episodes in the modeled attainment demonstration. The highest measured 8-hour concentration in the August episode was 87 ppb at the Alpine monitoring site. The highest measured 8-hour concentration during the September episode was 83 ppb and also occurred at Alpine.

ARB staff independently modeled a third episode that occurred in July 2005 as part of a Southern California regional analysis. This is not a comprehensive modeling analysis as ARB staff only used one episode. ARB's results from three days of the 5-day episode in July met the U.S. EPA criteria described earlier for San Diego. The highest measured 8-hour concentration during the episode was 81 ppb at the Alpine monitor.

Air Quality Model

The District used the "Comprehensive Air Quality Model with Extensions" (CAMx) with the [California] Statewide Air Pollution Research Center (SAPRC) SAPRC99 chemical mechanism to prepare the 2007 San Diego SIP. The CAMx model has also been selected by the staff of the ARB and the South Coast Air Quality Management District (SCAQMD) for SIP modeling in central and southern California.

The District used the Mesoscale Model version 5 (MM5) prognostic model to generate the meteorological inputs needed for CAMx. Some adjustments to the meteorological model output were done to improve agreement between simulated and measured or expected fields. The use of a prognostic model is consistent with U.S. EPA modeling guidelines[3].

---

[1] U.S. EPA (1991). United States Environmental Protection Agency. July 1991. Guideline for Regulatory Application of the Urban Air Shed Model. Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA-450/4-91-013.

[2] SDCAPCD (2007). San Diego County Air Pollution Control District. Eight-Hour Ozone Attainment Plan for San Diego County. San Diego, CA. April 2007.

[3] U.S. EPA (2006). United States Environmental Protection Agency. April 2007. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze. Office of Air Quality Planning and Standards, Research Triangle Park, NC.

Emissions Inventory

The District used ARB's emissions inventory, the California Emission Forecasting System (CEFS) version 1.06, with adjustments to reflect State emission control program regulations that will take effect before December 1, 2006 but are not reflected in CEFS v.1.06. The motor vehicle emissions in CEFS v.1.06 are derived from ARB's motor vehicle emissions models, EMFAC2007 and OFFROAD2007. The emissions are gridded for use in the photochemical model to approximate where in the modeling domain they occur. The model also adjusts the inventory to reflect temperature, humidity, and activity level that occurred during the ozone episodes.

In its analysis, the District assumed that currently banked emission reduction credits would be used in the attainment year. The District also modeled the impact of an allowance for increased military activity, through 2015, as requested by the military.

Model Results

The District's analysis of the model outputs includes the use of RRFs as described in U.S. EPA ozone air quality modeling guidance. The RRF approach allows the modelers to project design values from a reference year (in this case 2002) to a future year (2008). The San Diego District's projected 2008 values at the Alpine monitoring site are presented in Table A-I.

San Diego's photochemical air quality modeling predicted a 2008 design value of 86 ppb, which is narrowly higher than the attainment threshold of less than 85 ppb. This concentration is within U.S. EPA uncertainty range for demonstration attainment, provided WOE is also used.

Table A-I. Calculation of Model-Predicted 2008 Design Value at Alpine Monitoring Site (parts per billion)

Date	2002	2008	RRF*	Baseline	2008 Predicted
August 4	75.1	71.4	0.951	92.3	87
August 5	92.5	87.1	0.942	92.3	86
August 6	106.7	100.4	0.941	92.3	86
August 7	91.8	86.2	0.939	92.3	86
September 27	72.8	68.1	0.935	92.3	86
September 28	73.7	68.3	0.927	92.3	85
6-Day Average of Aug 4,5,6,7, and Sept 27,28	85.4	80.3	0.940	92.3	**86**

*RRF = Relative Reduction Factor
Source: San Diego APCD Ozone 8-Hour Attainment Plan, 2007.

ARB modeling supports San Diego's attainment demonstration. As previously mentioned, ARB staff conducted preliminary modeling for San Diego using the 2010 projected inventory without additional controls. ARB's modeling was done for the southern part of the State and focused on refining the analysis for the South Coast region, not San Diego. The model results projected a 2010 design value of 85 ppb at the Alpine monitoring site. Although ARB's analysis cannot be compared directly to the District's modeling, it supports the magnitude of the response to emission reductions demonstrated in the District's modeling, and future values that are amenable to a weight of evidence demonstration.

Weight of Evidence

Due to inherent modeling uncertainties, U.S. EPA guidance states that "for applications in which the modeled attainment test is not passed, a weight of evidence analysis may be used to support a determination that attainment will be achieved, despite the results of the modeled attainment test[1]." The table below provides the guidelines for a Weight of Evidence (WOE) demonstration.

Table A-2. Guidelines for WOE Determinations

Results of Modeled Attainment Test	Supplemental Analyses
Ozone	
Future Design Value <82 ppb, all monitor sites	Basic supplemental analyses should be completed to confirm the outcome of the modeled attainment test
Future Design Value 82-87 ppb, at one or more sites/grid cells	A weight of evidence demonstration should be conducted to determine if aggregate supplemental analyses support the modeled attainment test
Future Design Value greater than or equal to 88 ppb, at one or more sites/grid cells	More qualitative results are less likely to support a conclusion differing from the outcome of the modeled attainment test

San Diego's modeled attainment test resulted in a design value of 86 ppb in 2008. Per U.S. EPA guidance, the San Diego District incorporated a supplementary WOE demonstration. The District provided the following supplemental analyses:

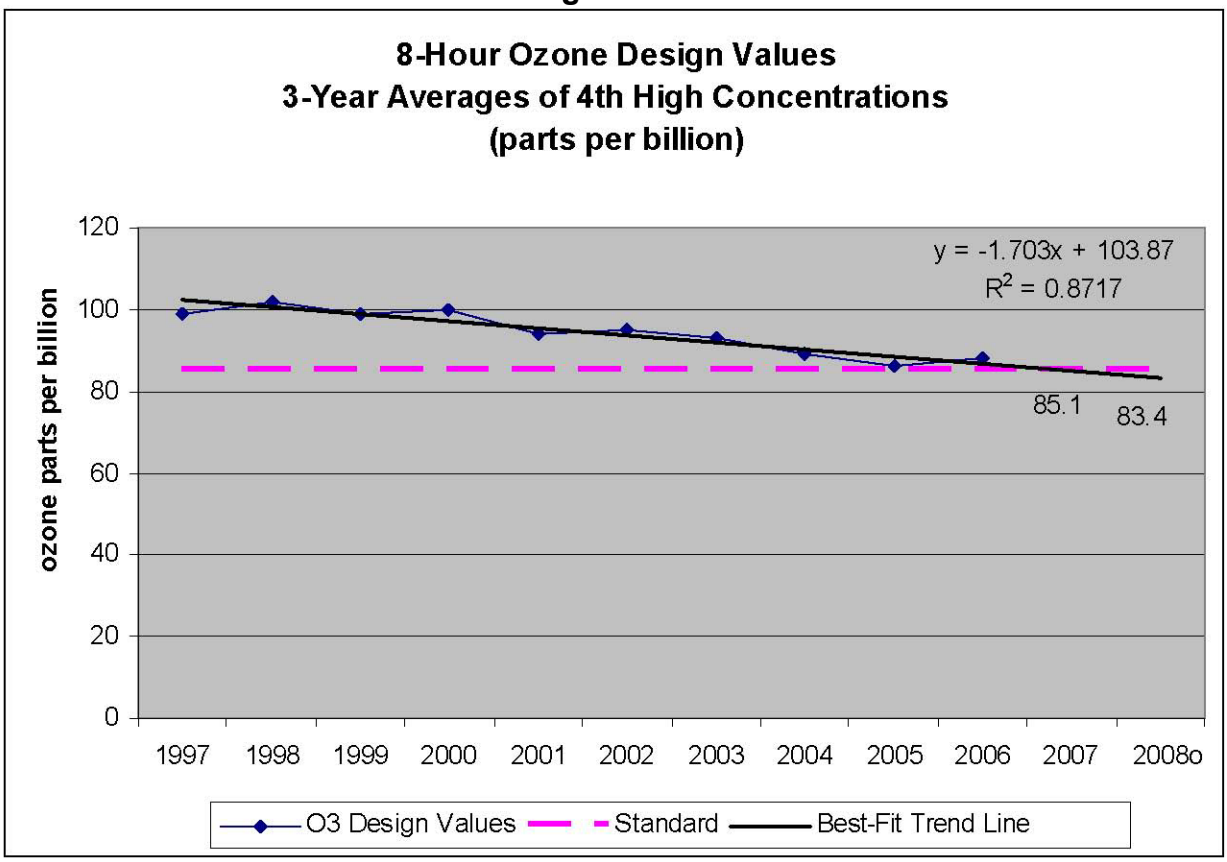
- An analysis of ozone concentrations in unmonitored areas, which indicated that the Alpine monitoring site adequately represents the maximum 8-hour ozone concentrations predicted within San Diego County;
- A modeled ozone exposure reduction metric, which suggested that the modeled values somewhat over-predict future ozone levels in the region and therefore can be considered to be conservative;
- A statistical analysis of 8-hour ozone concentration trends, which suggested that the District would attain by 2008 with its existing strategy;

[1] *Ibid*, U.S. EPA (2007).

- A regression analysis that relates ozone precursor emissions to 8-hour ozone concentrations, which suggested attainment by 2008 with and without emissions transported from the South Coast Air Basin.

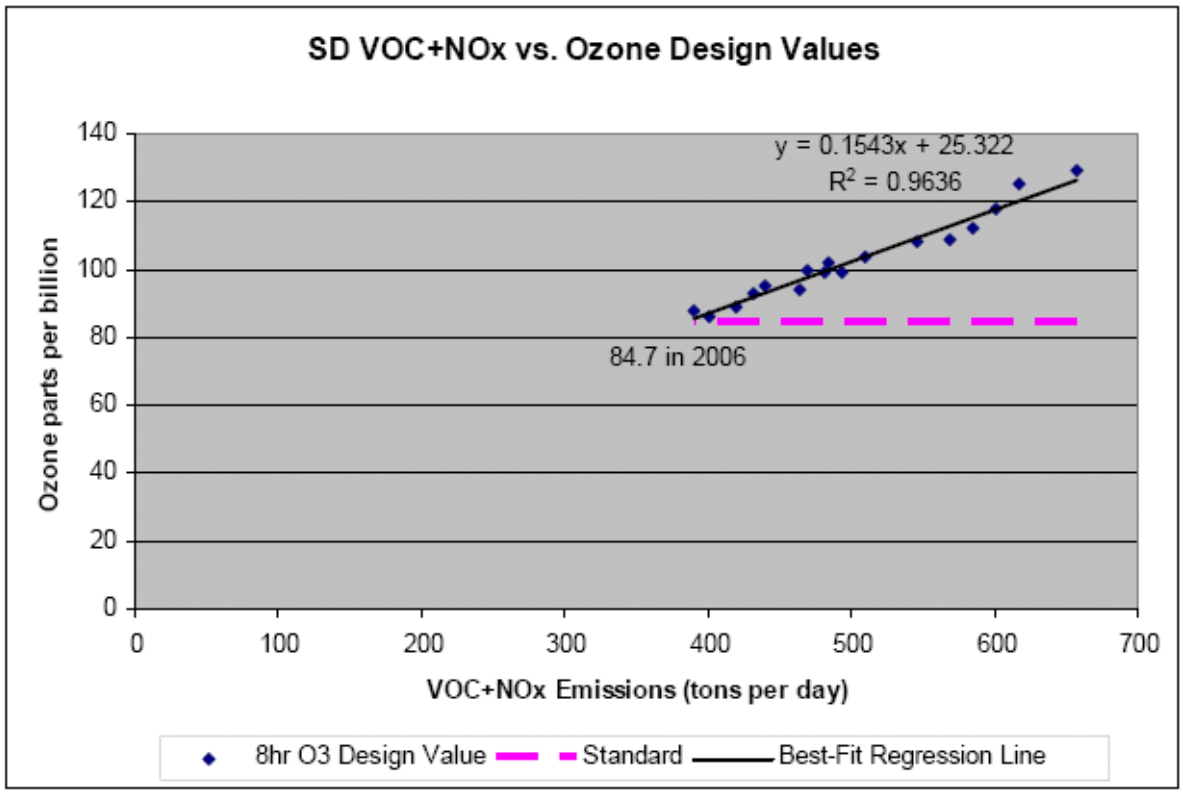
The supplemental analyses provide a comprehensive argument for attainment in 2009. The figure below illustrates the declining trend in measured ozone design values at the Alpine site from 1997 to 2006 (the only site that violates the 8-hour standard). The statistical analysis (best-fit trend line) predicts a design value of 83.4 ppb in 2008, demonstrating attainment.

Figure A-1



The figure below shows a strong statistical association between ozone precursor emissions in San Diego, ROG and NOx, and design values between 1990 and 2006. The best-fit regression illustrates that San Diego would have attained the standard in 2006 with a design value of 84.7 ppb. However, San Diego, along with the rest of California, experienced unusual meteorology in 2006, which was extremely conducive to ozone formation. Nevertheless, San Diego emissions are declining and this graph illustrates how close they are to attainment of the 8-hour standard.

Figure A-2



The weight of the evidence presented in these supplemental analyses supports the District's conclusion that its current strategy will result in attainment by 2008, even though the regional air quality modeling predicts a 2008 8-hour design value of 86 ppb.